MICROFLUIDIC CLOSED-END METERING SYSTEMS AND METHODS

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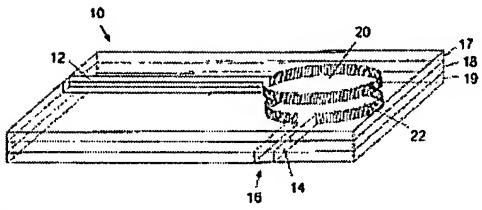
Microfluidic devices and methods for metering discrete plugs of fluid are provided. The microfluidic devices include an actuating channel, a metering channel and a deformable membrane disposed therebetween. The metering channel is in fluid communication with a fluid source, but is otherwise closed. The pressure in the actuating channel is varied to deform the deformable membrane. The volume of the metering channel varies in proportion with the deformation of the deformable membrane, creating a pressure differential between the metering channel and the fluid source. The pressure differential causes fluid from the fluid source to be drawn into or expelled from the metering channel.



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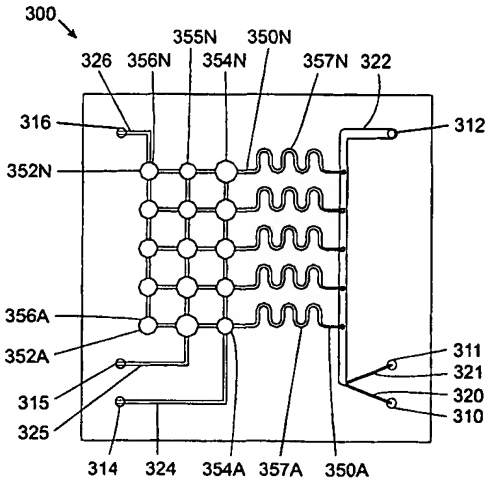

(57) Abstract: Microfluidic devices and methods for segregating aliquots of fluid from large fluid volumes are provided. Preferably, a device includes an actuating channel, a metering channel and a deformable membrane disposed therebetween. The metering channel is in fluid communication with a fluid source, but is otherwise closed. The pressure in the actuating channel may be varied to deform the deformable membrane. The volume of the metering channel varies in proportion with the deformation of the deformable membrane, creating a pressure differential between the metering channel and the fluid source that causes fluid to be drawn into or expelled from the metering channel. Magnetic or mechanical actuating means may be substituted for the actuating channel. Multiple aliquots of different liquids may be drawn into metering channels and mixed thereafter in one or many different mixing proportions.

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